

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0706-0188

Public reporting burden for this document is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0706-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 1 February 1986	3. REPORT TYPE AND DATES COVERED 7/15/84-7/14/85
4. TITLE AND SUBTITLE INTEGRATED MULTIAXIAL AND HIGH PRECISION COMPUTER CONTROLLED SERVOHYDRAULIC MECHANICAL TESTING SYSTEM			5. FUNDING NUMBERS AFOSR-84-0276
6. AUTHOR(S) William D. Nix			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Department of Materials Science and Engineering Stanford University, Stanford, California 94305			8. PERFORMING ORGANIZATION REPORT NUMBER 61102F 2917/A3
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR BLDG 410 BAFB DC 20332-6448			10. SPONSORING / MONITORING AGENCY REPORT NUMBER AFOSR-TR- 99 0741
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited.			12b. DISTRIBUTION CODE
13. ABSTRACT (Maximum 200 words) An electronically controlled, hydraulically actuated multiaxial (tension - torsion) mechanical testing system has been purchased from MTS and installed in the Peterson Laboratory at Stanford University. The instrument is controlled by a DEC computer. The equipment was made operational in September 1985 and is now available for use.			
14. SUBJECT TERMS			15. NUMBER OF PAGES 3
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

NSN 7540-01-280-5500

Standard Form 298 (890104) Graft
Prescribed by ANSI Std. Z39-18
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Final Report

for

Grant No. AFOSR-84-0276

**Integrated Multiaxial and High Precision Computer Controlled Servohydraulic
Mechanical Testing System**

Submitted to:

**AFOSR/DOD-URIP
Building 410, Room C216
Bolling Air Force Base, D.C. 20332
Attention: Dr. Alan H. Rosenstein**

Submitted by:

**Professor William D. Nix
Department of Materials Science and Engineering
Stanford University, Stanford, CA 94305**

February 1, 1986

This grant was awarded as a part of the DOD-University Research Instrumentation Program. The equipment awarded is an Automated Axial-Torsional Testing System complete with grips, extensometers and associated instrumentation. Also included in the award is a SX-RA50-EX (PDP 11/23) Microcomputer for control of the testing system. As required by the grant, cost sharing has been provided by Stanford University. Table 1 is a list of the equipment provided by this grant, together with an account of the cost sharing provided.

The testing equipment was purchased from MTS Corporation and the microcomputer from Digital Equipment Corporation. The equipment arrived at Stanford University in June of 1985 and was installed by MTS personnel in July of that year. Students began to use the equipment in August and by September were sufficiently proficient to demonstrate the full capabilities of the instrument. The equipment is now fully operational and is available for use by students, faculty and staff at Stanford.

AND FORMS OFFICE OF SCIENTIFIC RESEARCH (ASCI)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
The following information is being furnished to you as
requested by AFOSR-84-0276, Grant No. AFOSR-84-0276-12
on 10/10/85. It is being furnished to you as requested.
Sincerely,
John G. Givens, Director
Chief, Technical Information Division

The equipment provided by the grant will permit a new kind of mechanical testing to be done at Stanford University. Multiaxial mechanical tests can be done by using the combined tension-torsion capabilities of the new instrument. This will permit not only a more complete investigation of the mechanisms of deformation and fracture than can be done with axial testing alone but also a study of structural material behavior under the complex loading conditions which arise in practice. The torsional testing mode will also permit studies of deformation at large strains, such as those which arise in metal forming operations.



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Table 1
Integrated Multiaxial Testing System
Equipment Purchased and Distribution of Cost Sharing

<u>Funding Source</u>	DOD/URIP	DOE	ME/SU	MSE/SU	SE/SU	TOTAL
<u>Equipment Item</u>						
Series 809 Automated Axial-Torsional Testing System	\$125,000	-	\$4,000	\$6,250	\$22,500	\$157,750
Axial-Torsional Extensometer MTS 632.22	-	\$9,750	-	-	-	\$9,750
Axial-Torsional Grips MTS 64AT.22	-	\$9,000	-	-	-	\$9,000
SX-RA50-EX Microcomputer PDP 11/23	-	\$9,831	-	\$3,298	-	\$13,129
HP 7475A Plotter	-	-	-	\$1,042	-	\$1,042
Tax, Shipping	-	\$1,419	-	\$6,142	-	\$7,561
Totals	<u>\$125,000</u>	<u>\$30,000</u>	<u>\$4,000</u>	<u>\$16,732</u>	<u>\$22,500</u>	<u>\$198,232</u>

DOE = Department of Energy (Research Grant to A.K. Miller)

ME/SU = Department of Mechanical Engineering, Stanford University

MSE/SU = Department of Materials Science and Engineering, Stanford University

SE/SU = School of Engineering, Stanford University